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Risk management in international grain trade under martial law in Ukraine

Denys Rekachynskyi,

CFO/Development manager, Global Commodities Swiss SA,

Geneva, Switzerland, https://orcid.org/0009-0000-1915-346X

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Abstract. *Ukraine's role as a major global grain exporter was critically challenged by the full-scale war and the introduction of martial law, which generated complex economic, logistical and institutional risks in international grain trade. Blocked ports, disrupted supply chains, and heightened uncertainty reshaped export operations and created an urgent need to reassess approaches to risk management under extreme conditions.* ***Purpose*** *of the article is to identify the economic risks that emerged in Ukraine's international grain trade during 2022–2025 under martial law and to analyse the mechanisms applied by state institutions, businesses, and international partners to manage these risks.* ***Methods.*** *The study applies a systemic analytical approach to evaluating the risk structure in international trade, comparative analysis of export dynamics in pre-war and wartime periods, and case analysis of Ukrainian exporters and institutional responses. Statistical and structural-dynamic analyses are based on data from USDA, the Ministry of Agrarian Policy of Ukraine, the EU and specialized reports.* ***Results.*** *The war generated a multilayered crisis in grain exports, including infrastructure destruction, port blockades, financial instability, regulatory obstacles and market disruptions. Wheat exports in 2022–2023 declined by nearly 20%, while*

corn exports fell by about 5% due to logistical prioritization. A set of risk-mitigation measures was implemented at multiple levels: the Black Sea Grain Initiative, EU "solidarity lanes," international insurance programmes, price-hedging tools, and financial guarantees from EBRD and ECAs. These combined instruments enabled a recovery to almost pre-war export volumes (48.7 million tons) by 2023. ***Conclusions.*** *Effective risk management during wartime required a combination of diplomatic, financial and logistical mechanisms involving the state, business and international partners. The obtained results provide a foundation for shaping policies aimed at diversifying export infrastructure, strengthening military-risk insurance tools, developing exchange-based hedging instruments for agricultural markets, and increasing the resilience of supply chains. For businesses, the findings highlight the importance of flexible, integrated risk-management models that incorporate financial, logistical and institutional tools in conditions of prolonged instability.*

Keywords: *supply chains, trade risks, financial instruments, hedging, war risk insurance, logistics corridors, price volatility, agricultural exports, agricultural traders.*

Управління ризиками в міжнародній торгівлі зерновими в умовах воєнного стану в Україні

Рекачинський Денис Вікторович

CFO/Development manager, Global Commodities Swiss SA,

м. Женева, Швейцарія, https//orcid.org/0009-0000-1915-346X

Анотація. *Роль України як одного з провідних світових експортерів зернових зазнала критичного випробування внаслідок повномасштабної війни та запровадження воєнного стану, що спричинило складні економічні,*

логістичні та інституційні ризики у сфері міжнародної торгівлі зерновими. Блокування портів, порушення ланцюгів постачання та зростання невизначеності трансформували експортні операції й зумовили нагальну потребу переглянути підходи до управління ризиками в умовах екстремальних обставин. ***Мета статті*** *– виявити економічні ризики, що виникли у міжнародній торгівлі зерновими України у 2022–2025 рр. в умовах воєнного стану, та проаналізувати механізми, які застосовували державні інституції, бізнес і міжнародні партнери для їх подолання.* ***Методи.*** *У дослідженні використано системний аналітичний підхід до оцінювання структури ризиків у міжнародній торгівлі, порівняльний аналіз динаміки експорту в довоєнний і воєнний періоди, а також кейс-аналіз українських експортерів та інституційних реакцій. Статистичний і структурно-динамічний аналізи ґрунтуються на даних USDA, Міністерства аграрної політики України, ЄС та профільних звітів.* ***Результати.*** *Війна спричинила багаторівневу кризу в експорті зернових, що включала руйнування інфраструктури, блокаду портів, фінансову нестабільність, регуляторні обмеження та порушення ринкових механізмів. У 2022–2023 рр. експорт пшениці знизився майже на 20 %, тоді як експорт кукурудзи – приблизно на 5 % завдяки її логістичному пріоритету. На різних рівнях були реалізовані заходи щодо мінімізації ризиків: Ініціатива зернової угоди в Чорному морі, «шляхи солідарності» ЄС, міжнародні програми страхування, інструменти хеджування цінових коливань та фінансові гарантії EBRD і експортно-кредитних агентств. Сукупність цих інструментів дозволила відновити експорт майже до довоєнних обсягів (48,7 млн тонн) у 2023 році.* ***Висновки.*** *Ефективне управління ризиками в умовах війни потребує комплексного поєднання дипломатичних, фінансових та логістичних механізмів за участю держави, бізнесу й міжнародних партнерів. Отримані результати формують основу для вироблення політик щодо диверсифікації експортної інфраструктури, посилення інструментів*

страхування військових ризиків, розвитку біржових механізмів хеджування для аграрних ринків і підвищення стійкості ланцюгів постачання. Для бізнесу висновки підкреслюють важливість гнучких, інтегрованих моделей управління ризиками, що поєднують фінансові, логістичні та інституційні інструменти в умовах тривалої нестабільності.

Ключові слова: *ланцюги поставок, торговельні ризики, фінансові інструменти, хеджування, страхування воєнних ризиків, логістичні коридори, цінова волатильність, агроекспорт, агротрейдери.*

Problem statement. Ukraine is traditionally one of the world's leading grain exporters. It supplied 60 million tons of grain to global markets annually before the full-scale war (about 10% of the world market) [1]. The domestic agricultural sector provided over 40% of the country's export revenue and played a key role in global food security [1]. However, the Russian military invasion in February 2022 caused a sharp disruption to these established trade processes. Ukrainian Black Sea ports were completely blocked by Russian military means during the first months of the aggression [2], and agricultural exports almost ceased, which caused global concern about food shortages and price spikes. The war and the introduction of martial law radically transformed the grain market conditions: unprecedented threats arose – from the physical destruction of infrastructure and the risk to the lives of personnel to disruptions in logistics, financial instability, cyber and information attacks [3]. Under such conditions, the problem of effective risk management in international grain trade has become particularly urgent.

Previous research has examined wartime risks mainly from separate perspectives – logistical, financial, or geopolitical – while no comprehensive approach to their simultaneous integration under martial law has been developed. Within our study, new results were obtained, consisting in the development of an integrated multi-level risk-management model that, for the first time, synthesizes

diplomatic, logistical, financial, and organizational mechanisms for responding to the extreme challenges of international grain trade.

Analysis of recent research and publications. The issue of risk management under martial law is comprehensively revealed by D. V. Yarmus [3], who substantiated the need to adapt traditional management models to the crisis context, emphasizing the importance of inter-institutional coordination. T. Glauben et al. [4] emphasized the macroeconomic aspect of the impact of the war on agricultural trade. The researchers showed that the military blockade of Ukrainian ports caused global food risks and price volatility. The logistical challenges of grain exports during the war were systematized by V. Yanovska et al. [5], who revealed the need to develop border infrastructure and diversify routes.

The study by V. Tuliakov [6] complements earlier ones, analysing criminal and corruption threats within the Black Sea Grain Initiative, which form reputational risks for exporters. In the pre-war context, T. P. Motashko and D. V. Yakymets [7] outlined basic market risks and their classification, while N. V. Prikazyuk and D. V. Stelmakh [8] focused on financial hedging instruments, especially forward contracts in volatile market conditions.

The model of strategic management of logistics potential was proposed by U. O. Balyk and V. V. Khyliuk [9], who determined the relationship between logistics, investments, and state regulation. At the microeconomic level, Yu. O. Popov [10] investigated the marketing aspects of concluding forward agreements to minimize the risk of non-payment. This academic line is completed by A. V. Dimitrova [11], who summarized the risks of grain supplies to international markets and considered ways to reduce them within the scope of supply chain management. The approach to risk classification and treatment presented in the article generally correlates with the principles set out in ISO 31000:2018 [12], where risk management is defined as a continuous cycle integrated into all managerial processes.

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Highlighting previously unresolved parts of the general problem. Risk management in grain trade was considered in earlier studies separately – either from the perspective of logistics, finance, or international politics. However, there was no holistic approach that integrates diplomatic, financial, logistical, and organizational mechanisms of risk management under martial law. Our study attempts to fill this gap by proposing a systemic and structural model of multi-level risk management, based on the analysis of the practices of the state, business, and international partners.

Formulation of the article objectives (definition of the task). The aim of the research is to identify the features of risk management in international grain trade during war and martial law in Ukraine. The aim was achieved through the fulfilment of the following research objectives:

1) outline the consequences of the war for the volumes and directions of grain exports of Ukraine and identify the key risks that arose;

2) investigate the applied strategies and tools of risk management in international grain trade during the war.

Presentation of the main material of the study. The Russian aggression in 2022 caused a dramatic drop in volumes and a change in the structure of Ukrainian grain foreign trade. Exports almost ceased in the first months of the war because of a naval blockade – commercial vessels could not leave the Black Sea ports [2]. Although attempts were made to transport by land (by rail and road), the volumes were initially insignificant because of logistical difficulties and limited throughput capacity of the western borders [4].

In April 2022, the USDA revised its grain export forecast: the expected volumes for the 2021–2022 marketing year (July–June) were reduced by 18% for corn (from 33.5 to 27.5 million tons) and by 12% for wheat (from 24 to 20 million tons) [12]. A marketing year is a period used to record the production, export, and

consumption of agricultural crops, and usually begins immediately after the harvest (for cereals, from July of one year to June of the next).

Despite the war, Ukraine still managed to export significant volumes during this period (about 48 million tons of the main cereals – wheat and corn combined), which was one of the highest figures in the last 15 years [4]. However, the figures fell sharply in the following marketing year.

Table 1 illustrates the dynamics of Ukrainian grain exports (wheat and corn) before and during the war.

Table 1

Export volumes of major grain crops of Ukraine in the pre-war and war periods (marketing years, million tons)

Marketing year	Wheat	Corn	Total (wheat and corn)
2021/22 (before the war)	About 20.0	About 27.5	About 47.5
2022/23 (wartime)	16.2	26.0	42.2
2023/24 (wartime)	19.9	28.8	48.7

Note: the data for 2021/22 – USDA estimate considering the impact of the outbreak of war; for 2022/23 and 2023/24 – actual export volumes according to the Ministry of Agriculture and Food of Ukraine.
Source: based on analysis [13; 14]

Table 1 shows that wheat exports decreased by almost 20% in the first full marketing year of the war compared to the pre-war level, and corn exports – by only ~5%, which is explained by the priority removal of corn from storage (it occupied more than half of the cargoes during the blockade) [2]. In 2023–2024, there was a partial recovery thanks to the export corridors, the total volumes of the two main crops almost reached pre-war levels.

In addition to the general decline in export potential, the war led to a radical change in the directions and methods of grain trade. Before the invasion, the overwhelming share of exports (about 90%) was shipped by sea through the deep-water ports of Odessa and Mykolaiv. However, the role of alternative routes – land

corridors to the EU and river ports on the Danube – in the logistics structure has sharply increased after February 2022. In the first months of the crisis, exports could only be made via western land routes [15], which led to a temporary reorientation of supplies to the European market. The EU's share in the geography of Ukrainian agricultural exports increased sharply – the EU began to receive about 50% of supplies, while the share of Asian countries decreased (Asian importers were wary of war risks during long sea voyages) [15]. According to traders, European counterparties showed greater willingness to work with Ukrainian grain despite the danger of war, while a number of buyers from Asia and the Middle East suspended purchases at the beginning of the war [15]. So, the war caused not only a quantitative decline in exports, but also a geographical and logistical restructuring of trade.

The key risks in international grain trade generated by the war can be grouped into several categories (Table 2).

Table 2

Key risks in international grain trade caused by war and martial law in the country

Item No.	Risks	Analytical review, cases
1	Physical and security risks	Direct military intervention led to the destruction of critical agricultural infrastructure – elevators, port terminals, railway tracks, warehouses. In particular, in 2022–2023, large grain storage facilities were damaged or destroyed by rocket attacks (for example, in Mykolaiv, Odessa, at the Danube ports) [1]. The occupation of some territories led to the loss of assets of agricultural enterprises: according to estimates, 5 out of 30 elevators of the leading trader – Nibulon – ended up in the captured territories [15]. In addition to material losses, there are risks to the life and health of company personnel – a tragic example was the death of the founder of Nibulon O. Vadatursky as a result of shelling [15]. Security risks also include mine hazards in fields and ports, the risk of ships being captured or damaged when attempting to pass through the Black Sea, piracy, and the risks of cyberattacks and sabotage against logistics facilities.

2	Logistical risks	The complete blockade of sea routes at the beginning of the war and their unstable operation thereafter significantly complicated the fulfilment of foreign economic contracts. Even after the launch of the "grain corridor" in 2022, shipping was constantly under threat of disruption – each ship required special insurance, underwent inspections, queues and delays arose. After the Russian unilateral withdrawal from the Black Sea Grain Agreement (July 2023) and the resumption of shelling of ports, the situation became critically complicated again [1]. Traders had to reorient flows to longer and more expensive routes via the Danube and European countries, which created bottlenecks at the borders, railway congestion, and a shortage of wagons and barges. According to EU data, about 88.1 million tons of Ukrainian grain, oilseeds and products were exported from May 2022 to December 2023 through the so-called "solidarity routes" (rail, road and river transport) [5] – an enormous volume achieved due to significant logistical efforts. However, these land channels have not fully replaced sea ones: their capacity is limited and the cost of transportation is higher, which reduced the price competitiveness of Ukrainian grain.
3	Market and price risks	The war triggered sharp price fluctuations on global grain markets. Food prices had been rising since late 2021, but the Russian invasion of Ukraine pushed them to record levels. In March 2022, the FAO Grain Price Index exceeded the peaks of previous food crises [4]. There was panic on the exchanges: wheat futures on Euronext jumped by ~25% in the two weeks after the war began – from ~€317/t to €397/t (March 7, 2022) [4]. Although the market later calmed down somewhat, prices remained historically high. This meant increased price risk for exporters and importers: the difference between the planned contract price and the price at the time of delivery could be catastrophic. Ukrainian farmers and traders were faced with the threat of significant losses without proper hedging mechanisms. The full-scale war became the main factor in the volatility of agricultural producers' incomes, as the fighting reduced the area under cultivation and access to resources for growing grain. This exacerbated the need for financial instruments to protect against price fluctuations, but the derivatives market in Ukraine was underdeveloped at that time. The lack of widespread use of futures and options among Ukrainian market participants limited the possibilities to neutralize price shocks.

4	Financial and non-payment risks	The war worsened the financial condition of many agricultural enterprises, increasing the risk of defaults on contracts. On the one hand, importers were afraid to pay in advance for cargoes from a potentially blocked country. On the other hand, Ukrainian exporters themselves faced a lack of working capital, higher credit costs, and banks' refusal to confirm letters of credit for trade in the conflict zone. A liquidity risk arose: logistics delays meant "freezing" capital in grain stocks in warehouses. Furthermore, insurers and creditors initially classified Ukraine as a highest-risk zone, which made it difficult to receive insurance payments and finance foreign trade transactions. Under such circumstances, companies could only count on the support of international partners or were forced to work through intermediaries in third countries.
5	Regulatory and legal risks	Responding to the war crisis, governments of both Ukraine and other countries introduced sharp trade restrictions that affected the market. The Ukrainian government temporarily restricted the export of certain agricultural crops in March 2022 to protect domestic consumption and contain prices. It introduced licensing or bans on the export of rye, oats, millet, buckwheat, sugar, etc. (these restrictions were weakened later). Some other exporters acted similarly – for example, Serbia and Hungary imposed bans on the export of grain and oil at the beginning of the war [4]. Such steps limited the supply on international markets and increased the price increase. Another dimension of risk was the actions of importing countries. In 2023, several EU countries neighbouring Ukraine (Poland, Hungary, Slovakia) unilaterally banned the import of Ukrainian grain, motivating this by protecting their own farmers [1]. Although the European Commission eventually agreed to a compromise solution (temporary import restrictions to five bordering countries with financial assistance to them), such actions created legal uncertainty and forced the redirection of trade flows. It is worth noting the reputational and legal risks associated with the phenomenon of Ukrainian grain theft in the occupied territories. Russia, as documented, illegally exported grain from captured Ukrainian grain elevators and tried to sell it on the world market [6]. International traders were at risk of being involved in stolen grain trade schemes, which could lead to criminal prosecution for complicity in wartime looting and serious reputational losses. Swiss regulatory authorities even warned local

		commodity traders about their responsibility for transactions with questionable Ukrainian grain [16].

Source: based on the analysis [1; 4–6; 15; 16]

In summary, martial law created a multi-level crisis for grain trading companies: from purely physical threats to supplies to financial and legal problems. Traditional risk management systems that business entities used in peacetime turned out to be ineffective in wartime. They were unable to prevent significant losses, because the scale and nature of risks had changed dramatically. In such conditions, there was a need to adapt risk management approaches and implement emergency measures to support exports.

Figure 1 presents a multilevel risk-management model that reflects a coordinated system of responses to threats in international grain trade during wartime. The model encompasses four interrelated levels.

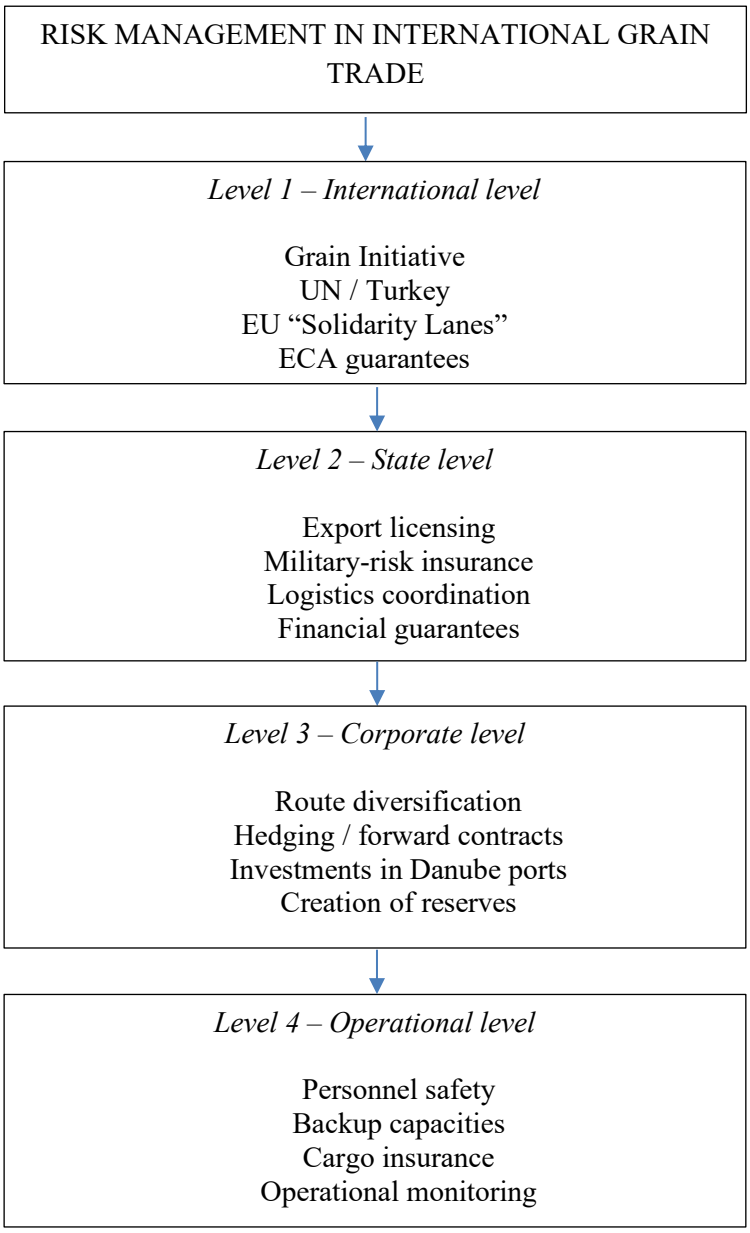

Fig. 1. Multilevel risk management model in international grain trade

This structure demonstrates the comprehensive nature of risk management in wartime and summarizes the key mechanisms employed to maintain the stability of Ukraine's grain exports.

Therefore, the logical continuation of our study is to analyse how market participants and the state responded to new challenges, what risk management strategies were used.

Faced with the risks described above, the Ukrainian government, the international community, and businesses promptly took a number of steps to minimize losses and gradually restore grain exports. Risk management in wartime has become complex and multi-level combining diplomatic, logistical, financial, and technological solutions.

Let us consider the main strategies used and their effectiveness.

1. The Grain Corridor and international agreements. The most large-scale logistical risk management measure was the Black Sea Grain Initiative, concluded under the mediation of the UN and Turkey in July 2022 [1]. This agreement provided a humanitarian maritime corridor for ships carrying Ukrainian grain from the ports of Odesa, Chornomorsk, and Pivdenny under guarantees of non-interference from the Russian naval forces [1]. Over 1,000 ship passages were made during the year under the Initiative, and almost 33 million tons of agricultural products were exported [2]. This allowed for a partial restoration of exports to about 5 million tons of grain per month, which is close to the pre-war average level [1]. The grain corridor significantly reduced logistical risks and tensions in the market: world grain prices, which rose sharply in the spring of 2022, gradually decreased after the launch of the initiative. It is particularly important that 65% of the wheat under the agreement was sent to developing countries (Africa, Asia) [2]. It was possible to provide food to the most vulnerable regions, reducing the global risks of famine. So, the international agreement became an effective risk management tool at the macro level, unblocking a key trade route. Unfortunately, Russia withdrew from the agreement in July 2023, restoring uncertainty [1]. However, the very precedent of coordinating the efforts of the UN, neighbouring states, and warring parties has shown that diplomatic levers can serve as a powerful tool for managing trade chain risks in emergency.

2. Diversification of logistics routes (“solidarity routes”). In parallel with the sea corridor, alternative export channels were deployed on land and rivers. In May 2022, the EU launched the “Solidarity Routes” initiative, which provided for the

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simplification of border procedures, the allocation of additional wagons, vehicles, and barges for the transportation of Ukrainian grain to EU ports [1]. The capacity of railway crossings was increased, transshipment in Danube ports (Izmail, Reni) and the port of Constanta in Romania was expanded. Ukrainian and international companies invested in the development of these routes: in particular, the trader Nibulon mentioned earlier built a new transshipment terminal on the Danube at its own expense, which allowed for the prompt shipment of cargo by barges to Constanta [15]. Thanks to such actions, exports gradually increased in the second half of 2022. Although land logistics are much more expensive and slower, they ensured the stability of supplies despite military risks at sea. By the end of 2022, up to 3 million tons of grain were being shipped monthly across the western border and the Danube. When the Black Sea ports became operational, a significant part of the flows still remained on European routes as a backup option. This diversification is a kind of hedging of logistical risk: even after the grain deal was cancelled in 2023, exports did not stop, but were redirected to existing land channels, which helped to avoid a new collapse in supplies. At the same time, a new challenge arose – regional trade conflicts: the surplus of Ukrainian grain on Eastern European markets put pressure on prices, provoking protests from local farmers. This led to temporary bans on Ukrainian grain imports to a number of EU bordering countries in 2023 [1], which required the intervention of the European Commission and financial support from these countries to resolve the situation. So, diversification of routes proved effective as a tool to ensure trade continuity, although it also created new risks – rising costs and trade frictions, which also needed to be managed.

3. War risk insurance and shipping support. A critical aspect of the recovery of exports was providing ships and cargo with war risk insurance. Initially, insurance premiums for entering the Black Sea increased significantly – insurance companies charged high premiums because of the danger of mines and shelling [15]. Some shipowners refused to sail to Ukraine even at high freight rates. In response, the

Ukrainian government, together with Western partners, developed a special cargo insurance program called UNITY in late 2022. This scheme provided shipowners with more affordable war risk insurance under the guarantees of international funds [17]. However, as traders noted, the proposed UNITY policy turned out to be too expensive compared to commercial insurance [15]. Fortunately, the global marine insurance market reacted quite quickly and flexibly: reinsurers developed mechanisms to cover risks in the Black Sea, as this was not the first armed conflict to affect shipping [15]. A few months after the launch of the grain corridor, insurance rates partially normalized and approached acceptable levels. Therefore, market insurance instruments finally provided coverage for shipping risks, albeit at an increased premium. Furthermore, the Ukrainian government tried to stimulate shipowners by compensating for part of the insurance costs (in the fall of 2023, funds were allocated from the budget to insure ships entering Danube ports after Russian shelling).

4. Price risk management: hedging and forward contracts. The sharp volatility of grain prices required adequate financial instruments to protect producers and traders from price shocks. Before the war, the level of use of hedging (price insurance through exchange-traded derivatives) in the Ukrainian agricultural sector was low, although the need for it was recognized by experts. The war made hedging a matter of business survival. In 2022–2023, large agricultural holdings and export companies began to more actively apply the practice of concluding forward contracts with fixed price, as well as entering external exchange platforms (CME, Euronext) to make insurance transactions. For example, in conditions of a shortage of grain carriers within the country, exporters bought futures to fix the current high price, knowing that physical shipment could take a month. The development of hedging has also received support at the state level: in 2023, the government announced plans to create, together with the EBRD, a programme to train agricultural producers in

the use of derivatives, as well as to develop a legislative framework for launching a derivatives market for agricultural products in Ukraine.

5. Attracting international financial support and risk reinsurance. To overcome problems with liquidity and financing of trade transactions in wartime, Ukrainian companies actively sought support from international financial institutions. For example, the EBRD expanded trade financing programmes for Ukraine, providing guarantees under letters of credit of Ukrainian banks. The ECAs of the G7 countries included Ukrainian risks in their programmes: in particular, in 2023, state ECAs of countries such as the United Kingdom, Canada, and the United States announced insurance lines for Ukrainian grain exports. In December 2022, the EU launched a special credit insurance scheme for European traders working with Ukraine, with a coverage of €20 million [15]. These steps served as a reinsurance of financial risks – they reduced the fears of Western counterparties regarding non-payment or force majeure. As a result, the world's largest grain traders (Cargill, Viterra, etc.) did not stop operations in Ukraine despite the war, although they adjusted their scale. Moreover, in 2023, private investors restored their interest in Ukrainian agribusiness, as international guarantees increased confidence. For small and medium-sized exporters, the Ukrainian government launched a programme of portfolio guarantees, which covered part of the risks of non-fulfilment of contracts.

6. Adaptation of companies' business models. Ukrainian agricultural companies and traders have demonstrated flexibility by restructuring their operations to extreme conditions. One example is the Nibulon's strategy, which was an integrated exporter with its own fleet of barges on the Dnipro before the war. After losing control of the port of Mykolaiv and blocking the Dnipro, this company reoriented logistics to rail and road transport and also invested in creating infrastructure on the Danube [15]. In 2023, Nibulon restored more than half of its pre-war export volumes, establishing a stable supply chain from farmers to the

Romanian port of Constanta [15]. Other large agricultural holdings, such as Kernel, also diversified sales channels, expanding their own elevator networks closer to the western border to reduce logistical overhead. In the area of operational risks, companies paid more attention to capacity reservation (for example, they rented additional warehouses outside Ukraine to store grain in case of disruptions). Considerable attention was also paid to personnel safety: companies developed plans for evacuating employees from dangerous areas, invested in protective equipment (bomb shelters, employee life insurance). Such adaptability of business models is one of the manifestations of effective internal risk management. Companies realized that the speed of response to changing circumstances became a competitive advantage.

Therefore, a multi-level risk management mechanism has been formed in international grain trade in the face of the war in Ukraine. It includes diplomatic agreements (such as a grain agreement) to guarantee the safety of routes, engineering and logistics solutions (alternative routes) to ensure physical diversification, financial instruments (insurance, hedging, credit guarantees) to protect against market and credit risks, as well as organizational flexibility of business for a prompt response to crisis situations. A set of these measures has significantly mitigated the negative consequences of the war: despite the ongoing hostilities, Ukraine managed to export significant volumes of grain in 2022–2023 and prevent a global food catastrophe. The next step of our research is a comparative analysis: how exactly do risks and approaches to their management differ in peacetime and wartime, what lessons can be learned from the current crisis for the future.

Conclusions. The study showed that the war in Ukraine and the introduction of martial law caused unprecedented risks in the field of international grain trade, while stimulating the emergence of new approaches to managing these risks. First, military actions sharply reduced Ukraine's export capabilities, disrupting the usual logistics chains and causing a jump in world grain prices. Export volumes in 2022–

2023 fell by more than 10 million tons compared to pre-war levels, and the geography of supplies changed in favour of neighbouring European countries. Companies were affected by a variety of risks: from the physical destruction of infrastructure and danger to personnel to financial losses because of price volatility and contract uncertainty. Traditional risk management methods proved insufficient. It turned out that standard risk management systems, effective in peacetime, were unable to avert economic losses in wartime.

Second, extraordinary risk management strategies were applied to overcome the crisis, covering all levels. At the international level, the Black Sea Grain Initiative played a key role, ensuring a partial unblocking of exports and reducing tensions on global markets. In parallel, the EU and other partners opened alternative "solidarity corridors" that diversified routes and thereby hedged logistical risks. At the corporate level, Ukrainian agricultural companies demonstrated flexibility and resilience: they rebuilt supply chains (switching to rail, the Danube), promptly attracted insurance and financial instruments to protect against risks, introduced forward selling practices and began to use exchange hedging. Support from international financial institutions – guarantees, insurance, credit lines – reduced the risks of non-payment and liquidity. The combination of these measures made it possible to reach almost pre-war export rates in 2023, despite the ongoing military threat, which is a significant achievement in risk management.

Third, comparison of the pre-war and war periods revealed important lessons. The war confirmed that risk management in modern international trade must be proactive and comprehensive. Even unlikely but devastating events (wars, sanctions, pandemics) must be taken into account when planning business. For Ukraine, this means diversifying export infrastructure in the future (development of Danube ports, border hubs), creating reserve stocks and sales channels in case of emergencies, and integrating into the European transport system. It is also necessary to develop financial markets and insurance mechanisms: the war exposed the problem of the

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lack of a full-fledged derivatives market, so accelerating the launch of exchange-traded instruments for farmers will be a priority to reduce price risks. Another aspect is institutional and regulatory mechanisms: legislation should be adapted to the war and post-war conditions, providing for effective instruments of state support for exporters in times of crisis (insurance funds, guarantees, etc.).

From a practical standpoint, the study's findings emphasize the need to establish a national risk management framework for grain exports that aligns with international standards such as ISO 31000 and FAO risk concepts. This framework would ensure coordinated action among the state, regulators, and key traders during crises. In the logistical dimension, priority should be given to investing in the development of multimodal export corridors – including Danube ports, land border hubs, and railway infrastructure – alongside the implementation of digital monitoring systems for real-time tracking of bottlenecks. In the financial sphere, it is crucial to accelerate the launch of a domestic derivatives and hedging market for agricultural products, combining legislative updates with training programs for producers and traders, and to expand state guarantee and military-risk insurance instruments in cooperation with international financial institutions. Implementing these measures will transform ad hoc wartime decisions into a sustainable, institutionalized risk management system for Ukraine's grain trade sector.

In summary, risk management in international grain trade during the war in Ukraine has become a strength test for the entire system – the state, business, and international partners. Despite the enormous challenges, through synergy of efforts, it was possible not only to prevent the collapse of exports, but also to gain invaluable experience that will form the basis of a more sustainable and reliable risk management model for the future.

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